## **CLAIMS**

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- 1. A fuel cell system characterized by comprising:
- a fuel cell that receives a supply of fuel gas including hydrogen for generating electric power;
  - a fuel off-gas passage that is a passage for discharging fuel off-gas from the fuel cell;
  - a discharging mechanism that discharges the fuel off-gas from the fuel off-gas passage to outside;
- a nitrogen concentration estimation mechanism for estimating a nitrogen concentration of the fuel gas in the fuel cell; and
  - a discharge amount control mechanism for controlling an amount of discharged fuel off-gas that is discharged by the discharging mechanism depending on the nitrogen concentration estimated by the nitrogen concentration estimation mechanism.
  - 2. The fuel cell system according to claim 1, characterized in that the nitrogen concentration estimation mechanism estimates the nitrogen concentration from a physical quantity related to the fuel off-gas detected in the fuel off-gas passage.
- 3. The fuel cell system according to claim 2, characterized in that the nitrogen concentration estimation mechanism estimates the nitrogen concentration from a rate of pressure drop in the fuel off-gas passage during discharge of the fuel off-gas by the discharging mechanism.
- 4. The fuel cell system according to any one of claims 1 to 3, characterized in that the discharge amount control mechanism decreases the amount of discharged fuel off-gas in proportion to an increase in the nitrogen concentration when the discharging mechanism is operated while the operation of the fuel cell is stopped.

- 5. The fuel cell system according to any one of claims 1 to 4, characterized in that the fuel off-gas passage is connected to a fuel gas passage, which is a passage for supplying the fuel gas to the fuel cell.
- 6. The fuel cell system according to any one of claims 1 to 5, characterized in that the discharge amount control mechanism sets an open time of a purge valve for discharging fuel off-gas to outside longer in proportion to an increase in the nitrogen concentration of the fuel gas in the fuel cell.
- 7. The fuel cell system according to claim 1, characterized in that the nitrogen concentration estimation mechanism uses at least one among a pressure sensor that detects a pressure loss of between fuel gas entering and exiting the fuel cell, a pressure sensor that detects a pressure in the fuel off-gas passage, a hydrogen sensor that detects a hydrogen concentration in the fuel off-gas passage, an ultrasonic sensor that detects a sound velocity of fuel off-gas in the fuel off-gas passage, and a voltage monitor that detects a voltage of the fuel cell, in order to estimate the nitrogen concentration.
  - 8. The fuel cell system according to claim 1, characterized in that the nitrogen concentration estimation mechanism estimates the nitrogen concentration based upon a lapsed period after performing purging to discharge fuel off-gas to outside.

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- 9. The fuel cell system according to claim 1, characterized in that the nitrogen concentration estimation mechanism estimates the nitrogen concentration by operating the purge valve for discharging fuel off-gas to outside for a fixed open time in fixed cycles, and calculating a difference between a theoretical hydrogen consumption amount at that time and an actual hydrogen consumption amount.
  - 10. A fuel gas control method characterized by comprising the steps of: supplying fuel gas including hydrogen to a fuel cell to generate power;

discharging fuel off-gas to outside from a fuel off-gas passage that is a passage for discharging fuel off-gas from the fuel cell;

estimating a nitrogen concentration of the fuel gas in the fuel cell; and controlling an amount of discharged fuel off-gas that is discharged to outside depending on the estimated nitrogen concentration.